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Radiative fluxes at high latitudes: Implications for climate research

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It is speculated that an amplification of greenhouse warming in the Arctic can be partly explained by the feedback associated with the high albedo of polar snow and ice. The extent of perennial sea ice has declined 20% since the mid-1970s. The location of the reduced ice in spring and summer coincides with highest solar radiation. If ice is lost, extra heat can be stored in these regions and remain through winter and reduce ice thickness the following spring. This ice-albedo feedback can accelerate the loss of ice. Therefore, accurate estimates of shortwave fluxes are needed for investigating causes of ice loss. Observations, satellite estimates, and model simulations of radiative flux estimates over Polar Regions, at the surface, at the Top of the Atmosphere, and within the atmosphere, do not agree with each other. It is of interest to establish the accuracy of available information on radiative fluxes in these regions. We will review currently available information on such fluxes with a focus on satellite based estimates and present their evaluation against ground observations; selected numerical models outputs will be included in the evaluation. The impact of the observed differences on ice-albedo feedback will be estimated.